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A CHECKLIST OF MEGABENTHOS RECORDED IN THE GULF OF
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CSIRO Marine Laboratories Report 219

A Checklist of Megabenthos Recorded in the Gulf of Carpentaria, November–December 1990

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Summary

The megabenthos of the Gulf of Carpentaria was surveyed during November and December 1990. Over 840 species from 150 families were collected by beam-trawling a systematic grid of 107 stations.

Most taxa were in the phyla Crustacea (26%) and Mollusca (23%), followed by Echinodermata (17%), Porifera (12%), Coelenterata (7%). Minor phyla, seagrass and algae comprised the remaining 9%. Most taxa were rare: half (410) of the 846 species were collected at two or fewer stations and 35% (296) were collected at single stations. Ten of the 14 species that were 'common' in the gulf (occurred at > 50% of the stations) are also widely distributed throughout the Indo-West Pacific but occurred in low abundances in the gulf. The sand dollar, *Laganum* sp. 1 was both widely distributed in the gulf (43 stations) and abundant (20,949 individuals).

Most species were scavengers/ carnivores (345) or suspension–feeders (331), with fewer deposit–feeders (121) or herbivores (37).. Half (45%) of the scavengers/ carnivores species were decapods. A third (28%) of the suspension-feeding taxa were sponges. Although there were fewer deposit-feeding taxa, they made up 1090 t (64%) of the 1704 t collected.

The absolute mean biomass was 15.92 kg/station (s.e. = 5.2) and abundance was 4,453 individuals/ station (s.e. = 2,154). There were 59.8 species/station on average (s.e. = 5.8). Nearly all taxa (95%) were small (< 100 g). Two thirds (60%) of the taxa were mobile. Two spatangoid heart urchins accounted for 59% of the biomass but were collected at only 9 stations. Similarly, two Flabellid corals that accounted for nearly half (47%) of the total abundance (476,518) were collected at only 10 stations.

Community structure and distribution patterns were analysed by numerical classification techniques. These indicated 2 main station groups and 11 species groups, based on megabenthos presence or absence. The first station group was in the muddy sediments of the central and western gulf. The second station group was in the coarser sediments along the east and south-eastern margins of the gulf. The 11 species groups were divisible into species mainly found in the muddier sediments of the central/western gulf, species mostly found in the coarser sediments of the eastern and south-eastern gulf, species found throughout the gulf and highly localised suites of species.

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Introduction

The Gulf of Carpentaria is a large, rectangular (approximately 3.7×10^5 km^2) and shallow (< 70 m) tropical embayment between 11° S and 17.5° S, and 136° E and 142° E (Fig. 1). The physical environment of this northern Australian gulf has recently been described by Somers and Long (1994).

CSIRO Division of Fisheries sampled the fish and benthos of the Gulf of Carpentaria during a cruise in November and December 1990 on the 66 m FRV *Southern Surveyor*. The objectives of the cruise were to describe quantitatively the species composition and distribution of the fish fauna, and to describe both the megabenthos and infauna communities. The infauna communities have been described by Long *et al.* (1994) and the fish communities by Blaber *et al.* (1994). The relationship between infauna and sediment pigments was described by Burford *et al.* (1994). This report provides new data on the abundance, biomass and feeding types of the megabenthos. The data are analysed and interpreted further in Long *et al.* (in prep.).

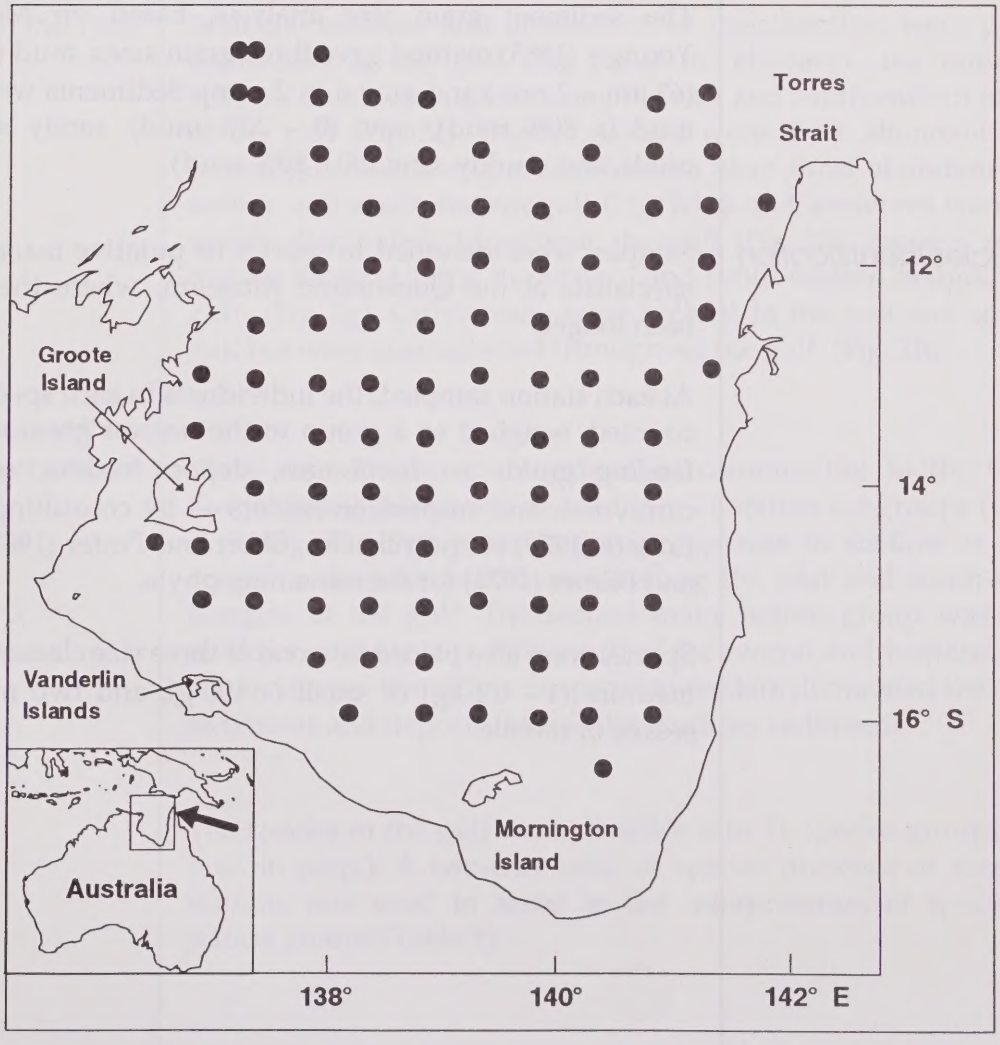

Figure 1. Gulf of Carpentaria and the sampling stations.

Materials and Methods

Field sampling

The Gulf of Carpentaria was divided into a 6 x 6 n.mile grid and from this, a systematic grid of 107 sample units, 30 n.miles apart were selected for sampling (Fig. 1). A station was randomly selected from within each 6 x 6 n.mile sample unit. The position of each station was fixed with the global positioning system.

The 107 stations were sampled between November and December 1990 by towing a 3.0 m wide by 1.2 m high, 30 mm mesh net beam trawl for 15 min at 6 km/h from the stern of the ship. One beam trawl haul was taken at each station. The large (> 1 kg) sessile megabenthos, mainly sponges, were removed from the sample, sorted into categories, counted and weighed (to the nearest 100 g) and a subsample was frozen for later identification. The remaining megabenthos was sorted on board into family taxa and frozen for transport to the laboratory. If the dredge was full, the complete sample was weighed and a subsample (approximately 20 kg) was processed as above.

The sediment grain size analysis, based on McLoughlin and Young's (1985) method gave three grain sizes: mud (< 63 μm), sand (63 μm – 2 mm) and gravel (> 2 mm). Sediments were described as mud (> 80% mud), sand (0 – 20% mud), sandy mud (20 – 50% mud), and muddy sand (80 – 80% mud).

Species Identification

Samples were identified to species or putative taxon by taxonomic specialists at the Queensland Museum, where the samples have been lodged.

At each station sampled, the individuals in each species group were counted, weighed as a group to the nearest gram and placed into feeding guilds — herbivores, deposit-feeders, scavengers and carnivores, and suspension-feeders — by consulting Fauchald and Jumars (1979) for polychaetes, Short and Potter (1987) for molluscs, and Barnes (1974) for the remaining phyla.

Species were also placed into one of three size classes: large (> 1 kg), medium (1 – 0.1 kg) or small (< 100 g); and two mobility classes: sessile or mobile.

Results and Discussion

Checklist of Species

A total of 846 species from 150 families were recorded, and are listed by phylum in the checklist in this report. The Crustacea were the most diverse (223 species), followed by Mollusca (194), Echinodermata (144), Porifera (104), Coelenterata (63), Annelida (48), Chordata (35) and Bryozoa (28). Seaweeds and seagrasses, Nemertea, Sipuncula and Echiura made up the remaining 16 putative species.

The gulf had high species richness but low average biomass (15.9 kg/trawl). Most taxa (95%) consisted of small (< 100 g) individuals. One half (48%) of the taxa were found at two or fewer stations and 35% were collected at only one station. Less than 1% of the taxa occurred at more than 50% of the stations. Two spatangoid heart urchins accounted for 59% of the biomass but were sampled at only 9 stations.

Distribution of megabenthos in the Gulf

Both the biomass and abundance of megabenthos were patchily distributed in the gulf (Fig. 2a & b). However, the number of species/trawl was highest along the east and south-eastern margins of the gulf (Fig. 2c). Deposit-feeders were most abundant in the central gulf, while suspension-feeders were most abundant in the eastern and south-eastern gulf (Fig. 2d & e). Carnivores were more evenly distributed throughout the gulf (Fig. 2f). Sponges reached highest biomass along the eastern and south-eastern margins of the gulf (Fig. 2g). Crustaceans were highest in the east and southern gulf but were also collected throughout the gulf (Fig. 2h).

Megabenthos communities

There were two main megabenthos communities in the Gulf of Carpentaria, which were divided into 11 station subgroups (Long *et al.* 1994). The first main station group was in shallow (< 45 m), coarser sediments (< 35% mud) along the east and south-eastern margins of the gulf. The second main station group was in the muddier sediments (> 60% mud) of the central and western gulf in waters deeper than 45 m. Suspension-feeders dominated the coarser sediments and deposit-feeders the muddier sediments.

The species in the gulf were divisible into 11 species groups (Long *et al.* in prep.). A two-way table of species presence or absence at stations was used to assist in the interpretation of species and station groups (Table 1).

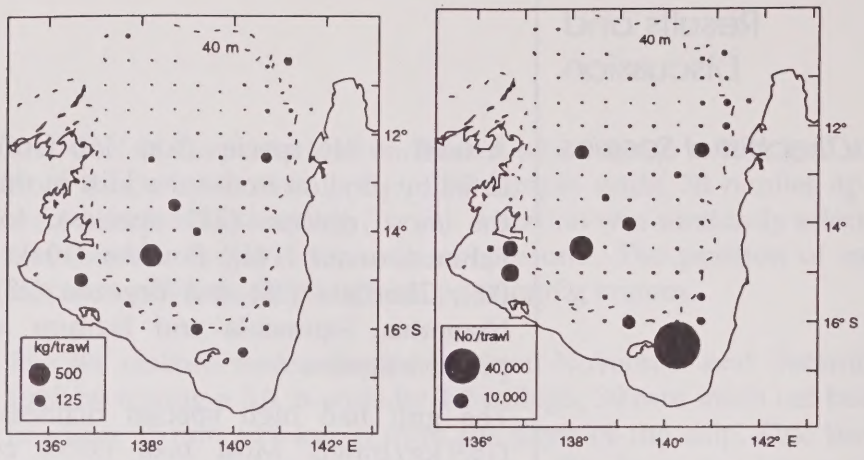

Figure 2 (a) Biomass of megabenthos (kg / trawl). (b). Abundance of megabenthos (number / trawl)

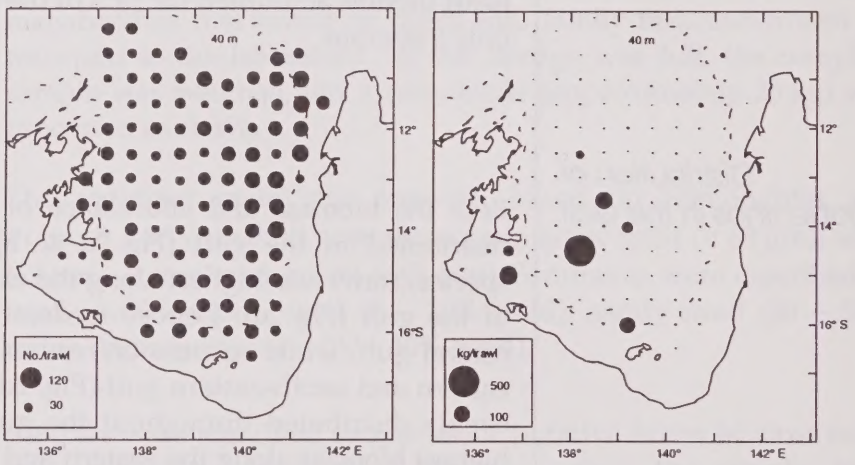

Figure 2 (c) Number of species / trawl). (d). Number of deposit-feeders / trawl

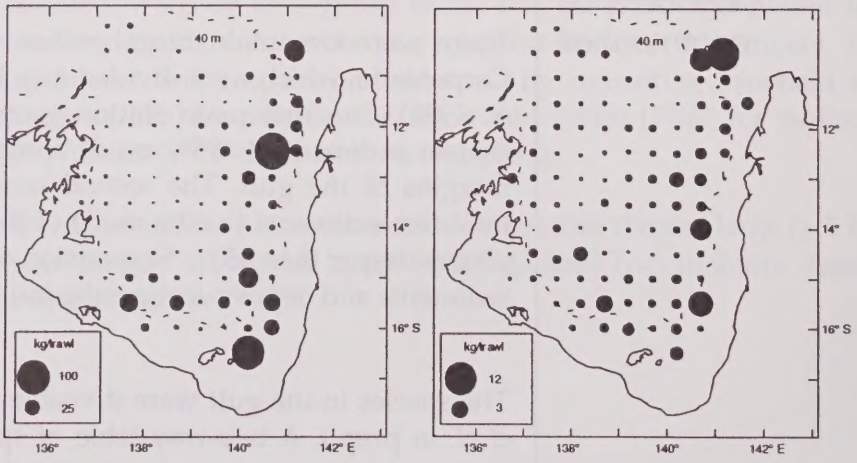

Figure 2 (e) Number of suspension-feeders / trawl). (f). Number of carnivores and scavengers / trawl

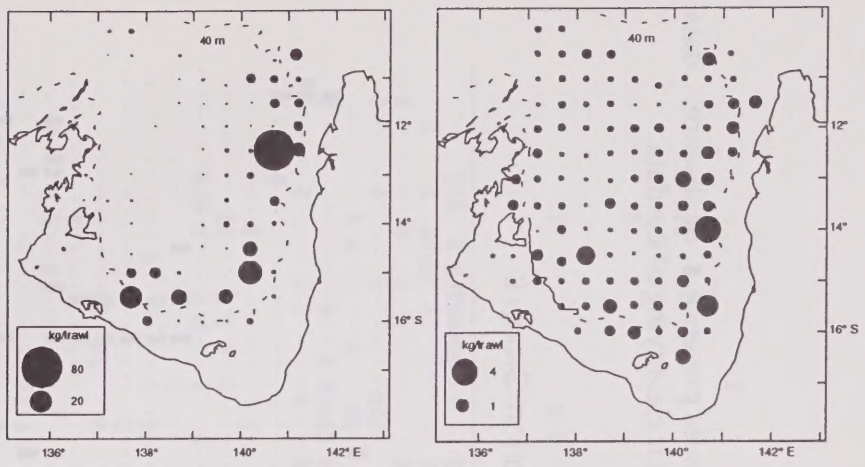

Figure 2.(g). Sponge biomass / trawl, and (h). Crustacean biomass / trawl

Acknowledgments

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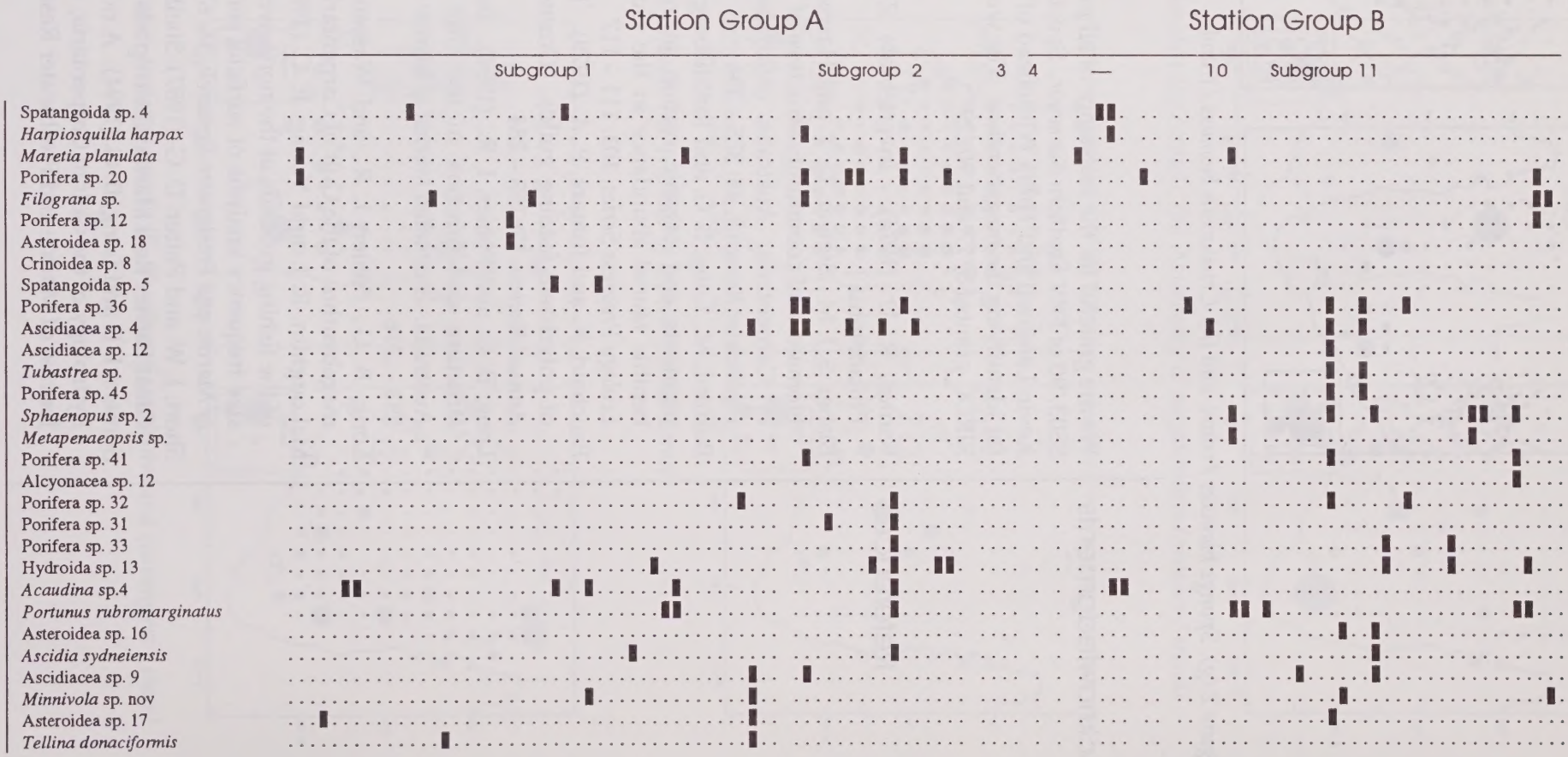
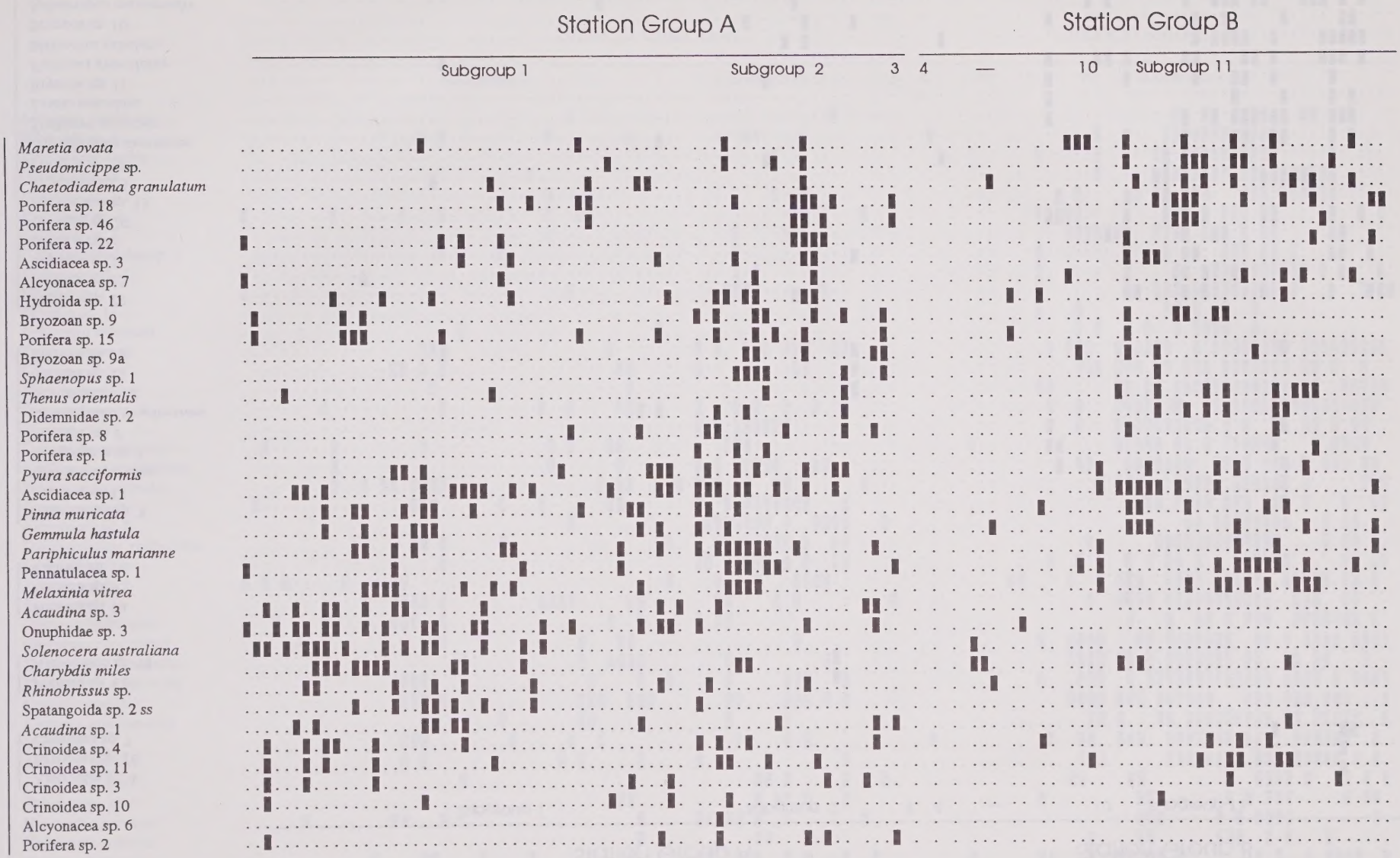
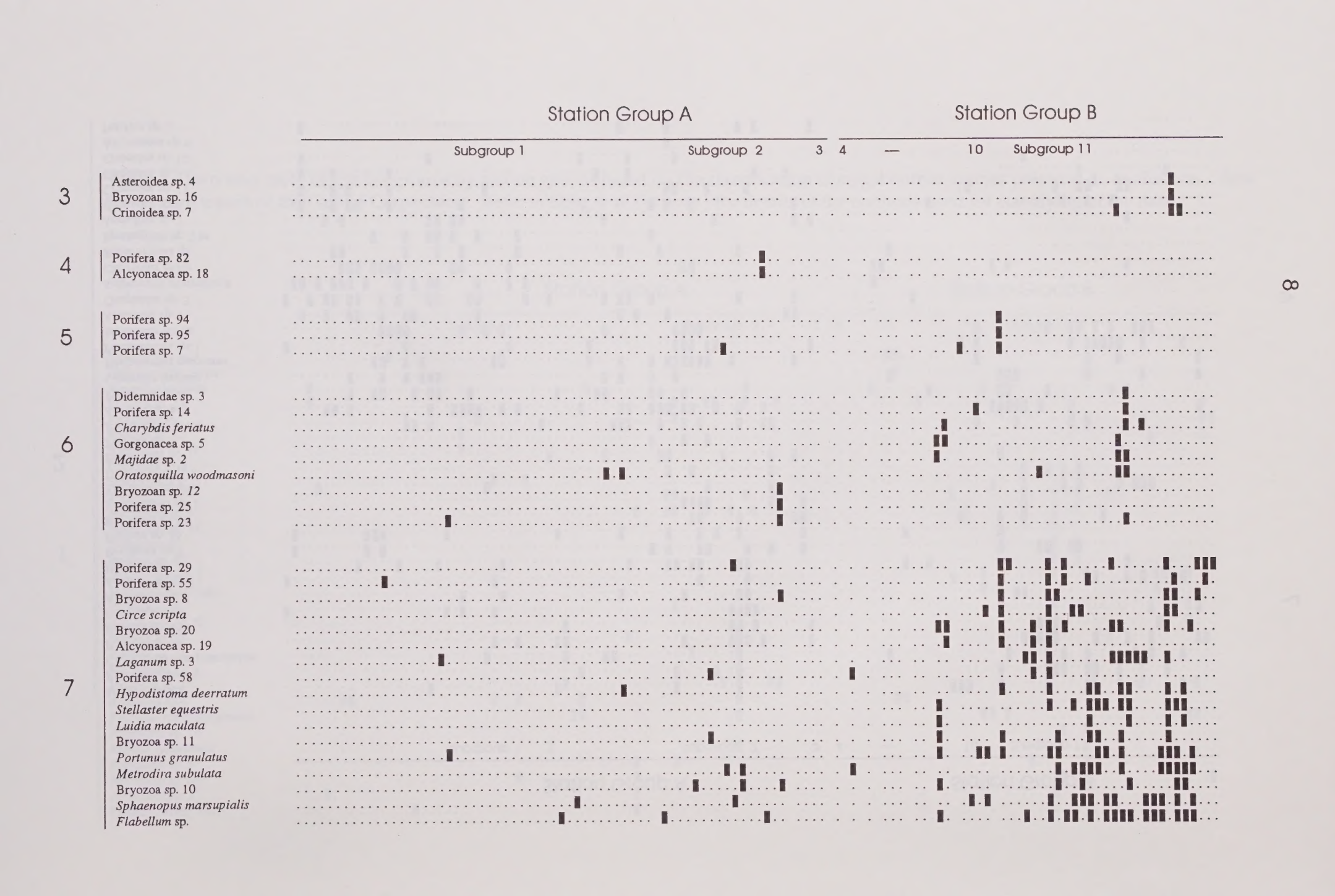
Table 1. Two-way table of species groups by station groups based on the classification of megabenthos species presence, ▮, or absence, ., data from beam trawls of the Gulf of Carpentaria. Refer to Long *et al.* (in prep.) for details of the methods used for classifying of the data.

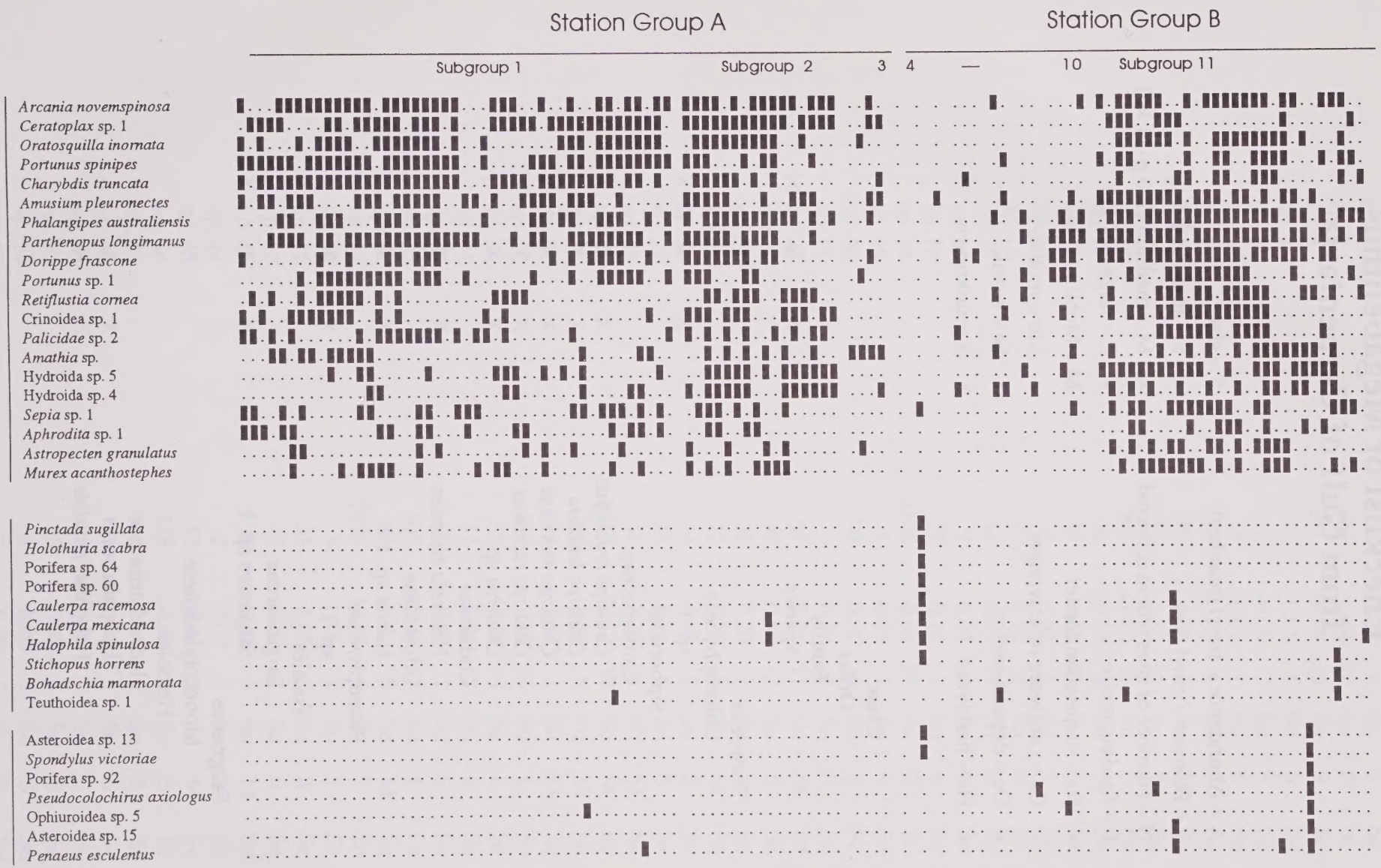



Station Group A
Station Group B
Subgroup 1
Subgroup 2
3
4
—
10
Subgroup 11
Maretia ovata
Pseudomicippe sp.
Chaetodiadema granulatum
Porifera sp. 18
Porifera sp. 46
Porifera sp. 22
Ascidiacea sp. 3
Alcyonacea sp. 7
Hydroida sp. 11
Bryozoan sp. 9
Porifera sp. 15
Bryozoan sp. 9a
Sphaenopus sp. 1
Thenus orientalis
Didemnidae sp. 2
Porifera sp. 8
Porifera sp. 1
Pyura sacciformis
Ascidiacea sp. 1
Pinna muricata
Gemmula hastula
Pariphiculus marianne
Pennatulacea sp. 1
Melaxinia vitrea
Acaudina sp. 3
Onuphidae sp. 3
Solenocera australiana
Charybdis miles
Rhinobrissus sp.
Spatangoida sp. 2 ss
Acaudina sp. 1
Crinoidea sp. 4
Crinoidea sp. 11
Crinoidea sp. 3
Crinoidea sp. 10
Alcyonacea sp. 6
Porifera sp. 2


Station Group A
Station Group B
Subgroup 1
Subgroup 2
3
4
—
10
Subgroup 11
3
Asteroidea sp. 4
Bryozoan sp. 16
Crinoidea sp. 7
4
Porifera sp. 82
Alcyonacea sp. 18
5
Porifera sp. 94
Porifera sp. 95
Porifera sp. 7
6
Didemnidae sp. 3
Porifera sp. 14
Charybdis feriatus
Gorgonacea sp. 5
Majidae sp. 2
Oratosquilla woodmasoni
Bryozoan sp. 12
Porifera sp. 25
Porifera sp. 23
7
Porifera sp. 29
Porifera sp. 55
Bryozoa sp. 8
Circe scripta
Bryozoa sp. 20
Alcyonacea sp. 19
Laganum sp. 3
Porifera sp. 58
Hypodistoma deerratum
Stellaster equestris
Luidia maculata
Bryozoa sp. 11
Portunus granulatus
Metrodira subulata
Bryozoa sp. 10
Sphaenopus marsupialis
Flabellum sp.

Station Group A
Station Group B
Subgroup 1
Subgroup 2
3
4
—
10
Subgroup 11
Antigonia lamellaris
Echinoida sp. 3
Xennophora indica
Ophiuroidea sp. 1
Laganum sp. 2
Hyastenus sp. 1
Echinoida sp. 2
Gorgonocephalidae sp. 1
Alcyonacea sp. 11
Majidae sp. 1
Bryozoa sp. 13
Polycarpa chinensis
Triphyllozoon sp.
Leucosia whitei
Myra mammilaris
Spiropagurus sp. 3
Bryozoa sp. 3
Lupocyclus rotundatus
Parthenopus longispinus
Solenocera pectinata
Jonas luteanus
Alcyonacea sp. 5
Trachypenaeus granulosus
Adeonellopsis sp.
Alcyonacea sp. 1
Bursa rana
Distorsio reticularis
Chicoreus cervicornis
Parthenopus hoplonotus
Xennophora solarioides
Leucosia ocellata
Portunus gracilimanus
Diogenes sp. 1
Strombus vittatus
Phallusia millari
Ophiuroidea sp. 6
Holothuria pervicax
Holothuria ocellata
Scrupocellaria sp.
Bryozoa sp. 2
Hydroida sp. 8
Octopoda sp. 1

Station Group A
Station Group B
Subgroup 1
Subgroup 2
3
4
—
10
Subgroup 11
Flabellum sp. 3
Flabellum sp. 2
Porifera sp. 11
Porifera sp. 80
Alcyonacea sp. 2
Philine sp. 1
Porifera sp. 10
Porifera sp. 3
Porifera sp. 28
Porifera sp. 30
Porifera sp. 2
Porifera sp. 9
Porifera sp. 39
Abalistes stellaris
Porifera sp. 43
Porifera sp. 37
Spatangoida sp. 7
Pentacta anceps
Dendostraea folium
Malleus albus
Haustellum multiplicatum
7
Laganum sp. 1
Asteroidea sp. 1
Cultellus cultellus
Ceratoplax sp. 2
Arcania septemspinosa
Dosinia mira
Corbula scaphoides
8
Corbula macgillivrayi
Liagore rubromaculata
Calappa terraereginae
Vepricardium multispinosum
Alcyonacea sp. 4
Metapenaeopsis palmensis
Carcinoplax purpurea
Bassina calophylla
Myra biconica
Ophiuroidea sp. 8
9


Station Group A
Station Group B
Subgroup 1
Subgroup 2
3
4
—
10
Subgroup 11
9
Arcania novemspinosa
Ceratoplax sp. 1
Oratosquilla inornata
Portunus spinipes
Charybdis truncata
Amusium pleuronectes
Phalangipes australiensis
Parthenopus longimanus
Dorippe frascone
Portunus sp. 1
Retiflustia cornea
Crinoidea sp. 1
Palicidae sp. 2
Amathia sp.
Hydroida sp. 5
Hydroida sp. 4
Sepia sp. 1
Aphrodita sp. 1
Astropecten granulatus
Murex acanthostephes
10
Pinctada sugillata
Holothuria scabra
Porifera sp. 64
Porifera sp. 60
Caulerpa racemosa
Caulerpa mexicana
Halophila spinulosa
Stichopus horrens
Bohadschia marmorata
Teuthoidea sp. 1
11
Asteroidea sp. 13
Spondylus victoriae
Porifera sp. 92
Pseudocolochirus axiologus
Ophiuroidea sp. 5
Asteroidea sp. 15
Penaeus esculentus

Checklist of Megabenthos from Gulf of Carpentaria

A = Abundance / trawl (number)

B = Biomass /trawl (kg)

N = Number of sites where collected

F = Feeding mode

- Su = suspension-feeder
- Ca = carnivore or scavenger
- De = deposit-feeder
- He = herbivore

S = size

- S = small (< 100 g)
- M = medium (100 g – 1 kg)
- L = large (> 1 kg)

M = Mobility

- Mo = mobile
- Se = sessile
- X = unknown

Class **Order** **Family** *Species*	**A**	**B**	**N**
Seaweeds			
Chlorophyceae			
sp. 1	X	X	X
Siphonales			
Caulerpaceae			
Caulerpa brachypus	X	X	X
Caulerpa lentifera	X	X	X
Caulerpa mexicana	X	X	X
Caulerpa racemosa	X	X	X
Caulerpa sp.	X	X	X
Codiaceae			
Halimeda discoidea	X	X	X
Udoteaceae			
Udotea sp. 1	X	X	X
Phaeophyceae			
sp. 1	X	X	X
Fucales			
Sargassaceae			
Sargassum sp. 1	X	X	X
Seagrasses			
Monocotyledoneae			
Helobiae			
Hydrocharitaceae			
Halophila ovalis	X	X	X
Halophila spinulosa	X	X	X

13		A	B	N	F	S	M
Porifera							
	sp. 1	33	1.79	4	Su	S	Se
	sp. 2	128	2.44	12	Su	S	Se
	sp. 3	241	2.78	10	Su	S	Se
	sp. 4	1	0.01	1	Su	S	Se
	sp. 5	7	0.06	3	Su	S	Se
	sp. 6	1	0.01	1	Su	S	Se
	sp. 7	17	0.60	3	Su	L	Se
	sp. 8	82	0.56	9	Su	M	Se
	sp. 9	215	1.58	13	Su	S	Se
	sp. 10	398	41.72	13	Su	L	Se
	sp. 11	99	16.13	4	Su	M	Se
	sp. 12	36	0.64	31	Su	S	Se
	sp. 13	6	0.08	1	Su	S	Se
	sp. 14	21	1.10	2	Su	S	Se
	sp. 15	54	0.25	14	Su	S	Se
	sp. 16	7	0.03	4	Su	S	Se
	sp. 17	17	0.12	5	Su	S	Se
	sp. 18	4174	4.62	19	Su	S	Se
	sp. 19	1	0.02	1	Su	S	Se
	sp. 20	70	0.71	8	Su	S	Se
	sp. 21	9	0.39	4	Su	S	Se
	sp. 22	97	2.31	11	Su	M	Se
	sp. 23	37	0.61	3	Su	S	Se
	sp. 24	21	0.20	1	Su	S	Se
	sp. 25	21	0.79	1	Su	M	Se
	sp. 26	2	0.03	1	Su	S	Se
	sp. 27	24	0.11	6	Su	S	Se
	sp. 28	51	3.13	4	Su	M	Se
	sp. 29	8027	71.17	10	Su	M	Se
	sp. 30	40	1.68	5	Su	M	Se
	sp. 31	161	1.42	2	Su	M	Se
	sp. 32	103	7.10	4	Su	L	Se
	sp. 33	33	4.08	3	Su	L	Se
	sp. 34	12	0.26	3	Su	S	Se
	sp. 35	5	0.27	1	Su	S	Se
	sp. 36	101	12.36	7	Su	L	Se
	sp. 37	88	5.4	8	Su	M	Se
	sp. 39	7856	19.67	6	Su	S	Se
	sp. 40	1	0.06	1	Su	S	Se
	sp. 41	31	1.05	3	Su	S	Se
	sp. 42	2	0.01	1	Su	S	Se
	sp. 43	8	0.48	3	Su	M	Se
	sp. 44	2	0.08	1	Su	S	Se
	sp. 45	12	0.47	2	Su	M	Se
	sp. 46	148	0.97	9	Su	S	Se
	sp. 47	8	0.16	5	Su	S	Se
	sp. 48	2	0.01	1	Su	S	Se
	sp. 49	11	0.08	2	Su	S	Se
	sp. 50	15	0.35	5	Su	S	Se
	sp. 51	1	0.08	1	Su	S	Se
	sp. 52	1	0.02	1	Su	S	Se

	A	B	N	F	S	M
sp. 53	2	0.01	1	Su	S	Se
sp. 54	1	0.01	1	Su	S	Se
sp. 55	263	6.58	7	Su	S	Se
sp. 56	1	0.17	1	Su	S	Se
sp. 57	3	0.35	2	Su	M	Se
sp. 58	37	0.57	4	Su	S	Se
sp. 59	7	0.31	1	Su	S	Se
sp. 60	7	1.30	1	Su	S	Se
sp. 61	7	0.03	1	Su	S	Se
sp. 62	7	0.12	1	Su	S	Se
sp. 63	7	0.12	1	Su	S	Se
sp. 64	147	2.72	1	Su	S	Se
sp. 65	9	0.19	2	Su	S	Se
sp. 66	7	0.06	1	Su	S	Se
sp. 67	7	0.03	1	Su	S	Se
sp. 68	15	0.06	1	Su	S	Se
sp. 69	16	0.17	2	Su	M	Se
sp. 70	9	0.18	2	Su	S	Se
sp. 71	106	0.30	5	Su	S	Se
sp. 72	1	0.01	1	Su	S	Se
sp. 73	1	0.01	1	Su	S	Se
sp. 74	1	0.01	1	Su	S	Se
sp. 75	3	0.01	1	Su	S	Se
sp. 76	6	0.09	1	Su	S	Se
sp. 77	6	0.12	1	Su	S	Se
sp. 78	12	0.08	1	Su	S	Se
sp. 79	12	0.06	2	Su	S	Se
sp. 80	54	1.89	1	Su	S	Se
sp. 81	1	0.03	1	Su	S	Se
sp. 82	10	0.50	1	Su	S	Se
sp. 83	70	0.35	1	Su	S	Se
sp. 84	9	0.16	2	Su	S	Se
sp. 85	10	0.18	3	Su	S	Se
sp. 86	1	0.04	1	Su	M	Se
sp. 87	4	0.06	2	Su	S	Se
sp. 88	1	0.01	1	Su	S	Se
sp. 89	2	0.01	1	Su	S	Se
sp. 90	2	0.15	2	Su	S	Se
sp. 91	3	0.16	2	Su	S	Se
sp. 92	1	0.41	1	Su	M	Se
sp. 93	1	0.14	1	Su	S	Se
sp. 94	3	1.65	1	Su	S	Se
sp. 95	2	1.57	1	Su	S	Se
sp. 96	2	0.08	1	Su	S	Se
sp. 97	5	0.04	1	Su	S	Se
sp. 98	1	0.04	1	Su	S	Se
sp. 99	10	1.78	1	Su	S	Se
Calcarea						
sp. 1	15	0.08	1	Su	S	Se
sp. 2	17	0.04	6	Su	S	Se
sp. 3	1	0.01	1	Su	S	Se

	A	B	N	F	S	M
Coelenterata						
Hydrozoa						
Hydroida						
sp. 2	1	0.01	1	Su	S	Se
sp. 3	24	0.04	4	Su	S	Se
sp. 4	766	2.10	36	Su	S	Se
sp. 5a	23	0.03	3	Su	S	Se
sp. 5b	2804	1.59	45	Su	S	Se
sp. 6	276	0.39	24	Su	S	Se
sp. 7	142	0.31	18	Su	S	Se
sp. 8	1185	1.50	17	Su	S	Se
sp. 9	58	0.38	7	Su	S	Se
sp. 10	31	0.39	6	Su	S	Se
sp. 11	159	0.10	14	Su	S	Se
sp. 12	99	0.07	9	Su	S	Se
sp. 13	585	0.62	8	Su	S	Se
sp. 14	578	0.10	3	Su	S	Se
sp. 15	101	0.14	5	Su	S	Se
sp. 16	4	0.01	1	Su	S	Se
sp. 17	1	0.01	1	Su	S	Se
sp. 18	1	0.01	1	Su	S	Se
Anthozoa						
Pennatulacea						
sp. 1	83	1.19	20	Su	M	Se
sp. 2	14	0.09	8	Su	S	Se
sp. 3	11	0.14	6	Su	S	Se
sp. 4	13	0.23	7	Su	S	Se
sp. 5	12	0.10	7	Su	S	Se
sp. 6	24	0.04	6	Su	S	Se
sp. 7	6	0.05	6	Su	S	Se
sp. 8	3	0.09	3	Su	S	Se
sp. 9	1	0.03	1	Su	S	Se
Gorgonacea						
sp. 1	2	0.01	1	Su	S	Se
sp. 2	12	0.06	5	Su	S	Se
sp. 3	63	0.08	9	Su	S	Se
sp. 4	2	0.01	1	Su	S	Se
sp. 5	66	0.17	3	Su	S	Se
sp. 6	4	0.02	3	Su	S	Se
sp. 7	8	0.01	1	Su	S	Se
Alcyonacea						
sp. 1	581	3.07	38	Su	S	Se
sp. 2	35	0.20	12	Su	S	Se
sp. 3	6	0.14	4	Su	S	Se
sp. 4	991	13.32	63	Su	S	Se
sp. 5	500	2.55	27	Su	S	Se
sp. 6	3	0.05	2	Su	S	Se
sp. 7	33	2.00	10	Su	M	Se
sp. 8	56	0.30	10	Su	S	Se
sp. 9	33	0.32	4	Su	S	Se
sp. 10	42	0.24	4	Su	S	Se
sp. 11	159	0.74	15	Su	S	Se
sp. 12	7	0.58	1	Su	S	Se

	A	B	N	F	S	M
sp. 13	27	0.20	4	Su	S	Se
sp. 14	8	0.40	4	Su	S	Se
sp. 15	26	0.11	4	Su	S	Se
sp. 16	74	0.35	6	Su	S	Se
sp. 17	3	0.06	1	Su	S	Se
sp. 18	6	0.46	1	Su	M	Se
sp. 19	12	0.09	5	Su	S	Se
Zoantharia						
Actiniaria						
sp. 1	1	0.12	1	Su	S	Se
sp. 2	3	0.02	2	Su	S	Se
Zoanthiniaria						
Zoanthidae						
Sphaenopus marsupialis	6947	32.50	15	Su	S	Se
Sphaenopus sp. 1	141	0.46	7	Su	S	Se
Sphaenopus sp. 2	146	1.15	6	Su	S	Se
unidentified	19	0.24	2	Su	S	Se
Scleractinia						
Tubastrea sp.	81	0.81	2	Su	M	Se
Flabellidae						
Flabellum sp.	423	1.86	20	Su	S	Se
sp. 2	98768	37.09	9	Su	S	Se
sp. 3	123428	49.36	1	Su	S	Se
Nemertea						
sp. 1	2	0.02	2	Ca	S	Mo
sp. 2	4	0.02	3	Ca	S	Mo
Sipuncula						
Sipunculus sp.	15	0.08	3	De	S	Se
Echiura						
Echiuroid sp.	23	0.23	1	De	S	Se
Annelida						
Polychaeta						
Spionida						
Chaetopteridae						
sp. 1	1	0.01	1	Su	S	Se
sp. 2	1	0.01	1	Su	S	Se
Capitellida						
Maldanidae						
sp. 1	2	0.01	2	De	S	Se
sp. 2	1	0.01	1	De	S	Se
sp. 3	2	0.01	2	De	S	Se
Phyllodocida						
sp. 1	5	0.03	3	Ca	S	Mo
sp. 2	5	0.03	3	Ca	S	Mo
sp. 3	1	0.01	1	Ca	S	Mo
sp. 4	1	0.01	1	Ca	S	Mo
sp. 5	2	0.01	2	Ca	S	Mo
sp. 6	1	0.01	1	Ca	S	Mo
sp. 7	1	0.01	1	Ca	S	Mo
sp. 8	13	0.07	7	Ca	S	Se

	A	B	N	F	S	M
Aphroditidae						
Aphrodita sp. 1	81	0.01	8	Ca	S	Mo
Aphrodita sp. 2	96	0.01	4	Ca	S	Mo
unidentified	1	0.01	2	Ca	S	Mo
Polynoidae						
sp. 1	15	0.01	1	Ca	S	Mo
Nepthyidae						
Nephtys sp. 1	1	0.01	1	Ca	S	Mo
Amphinomida						
Amphinomidae						
Chloeia flava	5	0.17	3	Ca	S	Mo
sp. 1	4	0.03	1	Ca	S	Mo
Eunicida						
Onuphidae						
sp. 1	2	0.01	1	Ca	S	Se
sp. 2	20	0.04	4	Ca	S	Se
sp. 3	1211	0.18	21	Ca	S	Se
sp. 4	891	0.19	13	Ca	S	Mo
Eunicidae						
Eunice cf. *indica*	205	0.14	11	Ca	S	Mo
Marphysa sp. 1	3	0.20	2	Ca	S	Mo
Marphysa sp. 2	1	0.01	1	Ca	S	Mo
sp. 1	1	0.01	1	Ca	S	Mo
sp. 2	2	0.01	1	Ca	S	Mo
Lumbrineridae						
sp. 1	2	0.01	1	Ca	S	Mo
sp. 3	1	0.01	1	Ca	S	Mo
Flabelligerida						
Flabelligeridae						
sp. 1	1	0.01	1	De	S	Se
unidentified	4	0.02	3	De	S	Se
Terebellida						
Terebellidae						
Pista sp.	1	0.01	1	De	S	Se
sp. 1	6	0.03	4	De	S	Se
sp. 2	2	0.01	1	De	S	Se
sp. 3	3	0.02	3	De	S	Se
sp. 4	2	0.01	1	De	S	Se
Pectinariidae						
Pectinaria sp.	1	0.01	1	De	S	Se
Sabellida						
Sabellidae						
sp. 1	5	0.03	3	Su	S	Se
sp. 2	2	0.01	1	Su	S	Se
sp. 3	1	0.01	1	Su	S	Se
sp. 4	89	0.09	2	Su	S	Se
sp. 5	2	0.01	2	Su	S	Se
Serpulidae						
Filograna sp.	76	0.38	6	Su	S	Se
sp. 1	203	0.17	10	Su	S	Se
sp. 2	6	0.02	2	Su	S	Se
sp. 3	2	0.01	1	Su	S	Se

	A	B	N	F	S	M
Crustacea						
Cirripeda						
Lepas sp.	20	0.01	1	Su	S	Se
Malacostraca						
Stomatopoda						
Squillidae						
Anchisquilla fasciata	13	0.09	9	Ca	S	Mo
Carinosquilla multicarinata	2	0.01	1	Ca	S	Mo
Clorida chlorida	5	0.04	3	Ca	S	Mo
Clorida granti	10	0.05	5	Ca	S	Mo
Clorida latreillei	42	0.13	21	Ca	S	Mo
Clorida malaccensis	16	0.04	8	Ca	S	Mo
Clorida micropthalma	5	0.03	4	Ca	S	Mo
Clorida miersi	12	0.03	6	Ca	S	Mo
Dictyosquilla foveolata	12	0.12	8	Ca	S	Mo
Harpiosquilla annandalei	14	0.20	10	Ca	S	Mo
Harpiosquilla harpax	6	0.42	2	Ca	S	Mo
Lophosquilla costata	20	0.07	10	Ca	S	Mo
Oratosquilla anomala	1	0.03	1	Ca	S	Mo
Oratosquilla inornata	1600	0.87	54	Ca	S	Mo
Oratosquilla woodmasoni	21	0.42	5	Ca	S	Mo
Squilloides sp. 1	14	0.06	8	Ca	S	Mo
Meiosquilla sp. 1	2	0.01	2	Ca	S	Mo
Odontodactylidae						
Coronidopsis bicuspis	15	0.06	11	Ca	S	Mo
Lysiosquilla acanthocarpus	2	0.01	1	Ca	S	Mo
Odontodactylus cultrifer	8	0.11	4	Ca	S	Mo
Gonodactylus sp.	1	0.01	1	Ca	S	Mo
Isopoda						
sp. 1	2	0.01	2	Ca	S	Mo
sp. 2	1	0.01	1	Ca	S	Mo
Decapoda						
Alpheidae						
sp. 1	7	0.03	5	Ca	S	Mo
sp. 3	26	0.08	7	Ca	S	Mo
sp. 4	3	0.02	3	Ca	S	Mo
sp. 5	12	0.04	6	Ca	S	Mo
sp. 6	1	0.01	1	Ca	S	Mo
sp. 7	2	0.01	1	Ca	S	Mo
sp. 8	4	0.02	3	Ca	S	Mo
sp. 9	1	0.01	1	Ca	S	Mo
unidentified	5	0.06	1	Ca	S	Mo
Penaeidae						
Atypopenaeus stenodactylus	103	0.18	15	Ca	S	Mo
Metapenaeopsis crassissima	7	0.01	1	Ca	S	Mo
Metapenaeopsis lamellata	2	0.01	1	Ca	S	Mo
Metapenaeopsis novaeguineae	1	0.01	1	Ca	S	Mo
Metapenaeopsis palmensis	1081	3.83	71	Ca	S	Mo
Metapenaeus endeavouri	8	0.14	3	Ca	S	Mo
Metapenaeus ensis	2	0.09	1	Ca	S	Mo
Parapenaeus longipes	24	0.08	7	Ca	S	Mo
Penaeus esculentus	12	0.41	4	Ca	S	Mo

	A	B	N	F	S	M
Penaeus semisulcatus	3	0.08	2	Ca	S	Mo
Trachypenaeus anchoralis	134	0.40	21	Ca	S	Mo
Trachypenaeus curvirostris	16	0.07	2	Ca	S	Mo
Trachypenaeus granulosus	317	2.18	33	Ca	S	Mo
Metapenaeopsis sp.	36	0.62	2	Ca	S	Mo
Trachypenaeus sp. 1	11	0.10	3	Ca	S	Mo
Trachypenaeus sp. 2	6	0.02	1	Ca	S	Mo
Solenoceridae						
Solenocera australiana	113	0.58	15	Ca	S	Mo
Solenocera pectinata	205	0.65	36	Ca	S	Mo
Sicyonidae						
Sicyonia cristata	85	0.29	27	Ca	S	Mo
Sicyonia sp.	1	0.01	1	Ca	S	Mo
Dromiidae						
Conchoecetes artifisciosus	106	0.26	10	Ca	S	Mo
Dromia dehaani	1	0.07	1	Ca	S	Mo
Dromidiopsis australiensis	1	0.01	1	Ca	S	Mo
Dorippidae						
Dorippe frascone	163	0.91	51	Ca	S	Mo
Paradorippe australiensis	22	0.07	11	Ca	S	Mo
Leucosidae						
Arcania gracilipes	3	0.02	2	Ca	S	Mo
Arcania novemspinosa	283	1.04	65	Ca	S	Mo
Arcania pulcheria	6	0.03	2	Ca	S	Mo
Arcania septemspinosa	280	0.47	53	Ca	S	Mo
Ebalia lambriformis	56	0.10	14	Ca	S	Mo
Iphiculus spongiosus	26	0.11	16	Ca	S	Mo
Ixa inermis	22	0.13	14	Ca	S	Mo
Ixoides cornutus	14	0.11	11	Ca	S	Mo
Leucosia anatum	16	0.05	6	Ca	S	Mo
Leucosia ocellata	229	0.81	40	Ca	S	Mo
Leucosia whitei	197	0.62	32	Ca	S	Mo
Myrodes eudactylus	52	0.33	15	Ca	S	Mo
Myra biconica	517	1.69	79	Ca	S	Mo
Myra elegans	11	0.03	6	Ca	S	Mo
Myra mammilaris	209	0.68	27	Ca	S	Mo
Oreophorus moram	4	0.03	4	Ca	S	Mo
Oreophorus reticulatus	4	0.04	4	Ca	S	Mo
Pariphiculus marianne	51	0.30	21	Ca	S	Mo
Oreophorus sp.	2	0.01	2	Ca	S	Mo
Ebalia sp. 2	24	0.07	11	Ca	S	Mo
Ebalia sp. 3	1	0.01	1	Ca	S	Mo
Leucosia sp. 1	38	0.08	16	Ca	S	Mo
Leucosia sp. 2	17	0.05	3	Ca	S	Mo
Leucosia sp. 3	41	0.21	3	Ca	S	Mo
Calappidae						
Calappa gallus	31	0.13	12	Ca	S	Mo
Calappa terraereginae	113	0.85	43	Ca	S	Mo
Matuta inermis	10	0.11	1	Ca	S	Mo

	A	B	N	F	S	M
Calappa sp.	1	0.01	1	Ca	S	Mo
Majidae						
Camposcia retusa	7	0.03	2	Ca	S	Mo
Hyastenus cambelli	26	0.27	3	Ca	S	Mo
Hyastenus diacanthus	14	0.05	5	Ca	S	Mo
Micippa excavata	23	0.10	11	Ca	S	Mo
Phalangipes australiensis	707	1.19	61	Ca	S	Mo
Thaconophrys longispinus	2	0.01	2	Ca	S	Mo
Micippa sp.	6	0.03	1	Ca	S	Mo
Pseudomicippe sp.	62	1.09	12	Ca	S	Mo
Oncinopus sp.	5	0.02	3	Ca	S	Mo
Hyastenus sp. 1	126	0.79	24	Ca	S	Mo
Hyastenus sp. 2	6	0.04	3	Ca	S	Mo
Hyastenus sp. 3	6	0.03	1	Ca	S	Mo
Hyastenus sp. 4	5	0.31	4	Ca	S	Mo
Majidae sp. 1	100	0.17	23	Ca	S	Mo
Majidae sp. 2	8	0.02	3	Ca	S	Mo
Majidae sp. 3	6	0.03	1	Ca	S	Mo
Parthenopidae						
Daldorfia investigatoris	12	0.03	1	Ca	S	Mo
Parthenopes harpax	32	0.30	2	Ca	S	Mo
Parthenopes hoplonotus	127	0.46	28	Ca	S	Mo
Parthenopes longimanus	354	1.15	69	Ca	S	Mo
Parthenopes longispinus	174	0.55	33	Ca	S	Mo
Parthenopes nodosus	18	0.07	3	Ca	S	Mo
Parthenope sp.	1	0.01	1	Ca	S	Mo
Heterocrypta sp.	15	0.06	10	Ca	S	Mo
Cryptopodia sp. 1	48	0.23	18	Ca	S	Mo
Cryptopodia sp. 2	42	0.16	17	Ca	S	Mo
Portunidae						
Charybdis feriatus	9	0.66	3	Ca	S	Mo
Charybdis truncata	246	1.33	56	Ca	S	Mo
Charybdis miles	63	1.03	17	Ca	S	Mo
Libystes edwardsii	26	0.09	16	Ca	S	Mo
Lisocarcinus polyboides	2	0.01	1	Ca	S	Mo
Lupocyclus rotundatus	142	0.64	31	Ca	S	Mo
Lupocyclus tugelae	96	0.32	28	Ca	S	Mo
Podopthalmus vigil	26	0.19	9	Ca	S	Mo
Portunus acerbiterminalis	78	0.12	15	Ca	S	Mo
Portunus gracilimanus	214	1.57	28	Ca	S	Mo
Portunus granulatus	110	0.33	14	Ca	S	Mo
Portunus pelagicus	1	0.16	1	Ca	M	Mo
Portunus rubromarginatus	86	0.50	8	Ca	S	Mo
Portunus rugosus	74	0.25	8	Ca	S	Mo
Portunus sanguinolentus	1	0.29	1	Ca	S	Mo
Portunus spinipes	296	0.43	56	Ca	S	Mo
Thalamita sexlobata	14	0.04	5	Ca	S	Mo
Thalamita sima	54	0.36	26	Ca	S	Mo
Portunus sp.	93	0.27	44	Ca	S	Mo
Thalamita sp. 1	3	0.01	1	Ca	S	Mo
Thalamita sp. 2	4	0.02	3	Ca	S	Mo

	A	B	N	F	S	M
Xanthidae						
Banareia inconspicua	1	0.01	1	Ca	S	Mo
Demania cultripes	2	0.02	2	Ca	S	Mo
Galene bispinosa	12	0.21	7	Ca	S	Mo
Halimede ochthodes	11	0.06	2	Ca	S	Mo
Hypocolpus punctatus	2	0.01	1	Ca	S	Mo
Liagore rubromaculata	78	0.64	35	Ca	S	Mo
Demania sp.	3	0.02	3	Ca	S	Mo
Actaea sp.	29	0.06	8	Ca	S	Mo
Banareia sp.	2	0.01	1	Ca	S	Mo
Chlorodiella sp.	4	0.01	1	Ca	S	Mo
Neoxanthops sp.	2	0.02	1	Ca	S	Mo
Liomera sp.	10	0.02	3	Ca	S	Mo
Atergatopsis sp. 1	3	0.02	1	Ca	S	Mo
Atergatopsis sp. 2	1	0.02	1	Ca	S	Mo
Corystidae						
Jonas luteanus	117	0.56	34	Ca	S	Mo
Paguridae						
Dardanus hessii	141	0.34	40	Ca	S	Mo
Dardanus imbricatus	76	0.26	7	Ca	S	Mo
Trizopagurus strigatus	21	0.05	4	Ca	S	Mo
Pagurus sp.	15	0.05	7	Ca	S	Mo
Diogenes sp. 1	225	0.41	33	Ca	S	Mo
Diogenes sp. 2	13	0.04	2	Ca	S	Mo
Diogenes sp. 3	6	0.01	1	Ca	S	Mo
Diogenes sp. 4	1	0.01	1	Ca	S	Mo
Spiropagurus sp. 1	102	0.30	28	Ca	S	Mo
Spiropagurus sp. 2	242	0.40	38	Ca	S	Mo
Dardanus sp. 1	14	0.05	7	Ca	S	Mo
Dardanus sp. nov.	100	0.25	7	Ca	S	Mo
sp. 1	5	0.03	3	Ca	S	Mo
Porcellanidae						
Porcellanella triloba	2	0.01	2	Ca	S	Mo
Polyonyx sp.	9	0.03	3	Ca	S	Mo
sp. 1	6	0.02	3	Ca	S	Mo
sp. 2	8	0.03	5	Ca	S	Mo
sp. 3	29	0.02	4	Ca	S	Mo
sp. 4	4	0.02	4	Ca	S	Mo
sp. 5	11	0.03	6	Ca	S	Mo
sp. 6	1	0.01	1	Ca	S	Mo
sp. 7	4	0.02	3	Ca	S	Mo
sp. 8	2	0.01	1	Ca	S	Mo
Galatheidae						
Galathea sp.	1	0.01	1	Ca	S	Mo
sp. 1	11	0.03	4	Ca	S	Mo
sp. 2	3	0.02	3	Ca	S	Mo
sp. 3	4	0.02	4	Ca	S	Mo
Scyllaridae						
Scyllarus hannii	123	0.39	38	Ca	S	Mo
Scyllarus rugosus	63	0.27	16	Ca	S	Mo
Thenus orientalis	24	1.26	12	Ca	M	Mo
Scyllarus sp. 1	2	0.01	1	Ca	S	Mo

	A	B	N	F	S	M
Scyllarus sp. 2	4	0.02	1	Ca	S	Mo
Scyllarus sp. 3	2	0.01	1	Ca	S	Mo
Gonoplacidae						
Carcinoplax purpurea	259	0.67	63	Ca	S	Mo
Eucrate dorsalis	4	0.02	4	Ca	S	Mo
Ommatocarcinus macgillivrayi	56	0.24	22	Ca	S	Mo
Typhlocarcinops sp.	1	0.01	1	Ca	S	Mo
Goneplax sp.	1	0.01	1	Ca	S	Mo
Eucrate sp. 1	31	0.11	17	Ca	S	Mo
Eucrate sp. 2	1	0.01	1	Ca	S	Mo
Pilumnidae						
Actumnus dorsipes	58	0.22	15	Ca	S	Mo
Actumnus pugilator	30	0.15	2	Ca	S	Mo
Bathypilumnus nigrispinifer	2	0.01	2	Ca	S	Mo
Bathypilumnus pugilator	105	0.34	21	Ca	S	Mo
Lophopilumnus globosus	8	0.36	3	Ca	S	Mo
Pilumnus semilanatus	27	0.22	7	Ca	S	Mo
Lophopilumnus sp.	1	0.01	1	Ca	S	Mo
Pilumnus sp. 1	160	0.35	28	Ca	S	Mo
Pilumnus sp. 2	15	0.01	2	Ca	S	Mo
Pilumnus sp. 3	6	0.05	3	Ca	S	Mo
Ceratoplax sp. 1	374	1.07	57	Ca	S	Mo
Ceratoplax sp. 2	270	0.52	49	Ca	S	Mo
Ceratoplax sp. 3	53	0.19	24	Ca	S	Mo
Ceratoplax sp. 4	6	0.02	3	Ca	S	Mo
Ceratoplax sp. 5	7	0.02	3	Ca	S	Mo
Ceratoplax sp. 6	1	0.01	1	Ca	S	Mo
Ceratoplax sp. 7	1	0.01	1	Ca	S	Mo
Thalassinidae						
Callianassa sp.	2	0.02	2	De	S	Mo
Thalassinia sp. 1	10	0.05	4	De	S	Mo
Thalassinia sp. 2	1	0.01	1	De	S	Mo
Upogebiidae						
Upogebia sp. 1	13	0.02	2	De	S	Mo
Upogebia sp. 2	3	0.01	1	De	S	Mo
Upogebia sp. 3	10	0.03	3	De	S	Mo
Stenopodidae						
Stenopus hispidus	15	0.05	5	Ca	S	Mo
Crangonidae						
Crangon sp. 1	11	0.03	6	Ca	S	Mo
Crangon sp. 2	2	0.02	2	Ca	S	Mo
Eumonidae						
Harovia sp.	8	0.03	3	Ca	S	Mo
Zebra sp.	1	0.01	1	Ca	S	Mo
Palicidae						
Palicus sp.	1	0.01	1	Ca	S	Mo
sp. 1	23	0.07	12	Ca	S	Mo
sp. 2	250	0.47	38	Ca	S	Mo
sp. 3	13	0.05	9	Ca	S	Mo
sp. 4	23	0.08	8	Ca	S	Mo
sp. 5	1	0.01	1	Ca	S	Mo
sp. 6	3	0.02	2	Ca	S	Mo

23	A	B	N	F	S	M
Mollusca						
Gastropoda						
Archaeogastropoda						
Trochidae						
Calliostoma monile	4	0.01	1	He	S	Mo
Echelus atratus	83	0.21	7	He	S	Mo
Monilea callifera	2	0.01	1	He	S	Mo
Thalotia sp. 1	2	0.02	2	He	S	Mo
Thalotia sp. 2	1	0.01	1	He	S	Mo
Mesogastropoda						
Strombidae						
Strombus erythrinus	16	0.03	1	He	S	Mo
Strombus vittatus	373	1.46	27	He	S	Mo
Terebellum terebellum	33	0.06	8	He	S	Mo
Strombus sp.	1	0.01	1	He	S	Mo
Ovulidae						
Phenacovolva rosea	4	0.01	2	Ca	S	Mo
Prionovula pudica	2	0.01	1	Ca	S	Mo
Volva volva	33	0.27	8	Ca	S	Mo
Cypraeidae						
Cypraea erosa	1	0.01	1	He	S	Mo
Cypraea miliaris	2	0.01	1	He	S	Mo
Cypraea vitellus	1	0.01	1	He	S	Mo
Cypraea walkeri	6	0.03	5	He	S	Mo
Turritellidae						
sp. 1	2	0.01	1	Ca	S	Mo
sp. 2	51	0.06	1	Ca	S	Mo
Muricidae						
Pterynotus alatus	3	0.03	3	Ca	S	Mo
Turritella terebra	56	0.14	18	Ca	S	Mo
Cymatiidae						
Distorsio reticularis	170	0.65	27	Ca	S	Mo
Gyrineum jacundum	12	0.06	3	Ca	S	Mo
Naticidae						
Natica solida	1	0.01	1	Ca	S	Mo
Natica vitellus	5	0.04	4	Ca	S	Mo
Polinices powisianus	1	0.01	1	Ca	S	Mo
Sinum haliotoideum	1	0.01	1	Ca	S	Mo
Bursidae						
Bursa rana	375	1.23	37	Ca	S	Mo
Xenophoridae						
Xennophora exuta	39	0.09	11	De	S	Mo
Xennophora indica	86	0.50	16	De	S	Mo
Xennophora solarioides	1142	1.16	38	De	S	Mo
Ficidae						
Ficus subintermedius	108	0.36	20	Ca	S	Mo
Cassidae						
Phalium bisulcatum	33	0.16	15	Ca	S	Mo
Epitoniidae						
Epitonium pallasi	10	0.06	1	Ca	S	Mo

	A	B	N	F	S	M
Cirsostrema sp.	1	0.01	1	Ca	S	Mo
Eulimidae						
Balcis martinii	2	0.01	2	Ca	S	Mo
Cerithiidae						
Rhinoclavis articulata	10	0.03	1	Ca	S	Mo
Lamellariidae						
Lamellaria sp.	2	0.01	1	Ca	S	Mo
Neogastropoda						
Conidae						
Conus aculeformis	4	0.02	4	Ca	S	Mo
Conus acutangulus	1	0.01	1	Ca	S	Mo
Conus adami	2	0.01	2	Ca	S	Mo
Conus lizardensis	23	0.12	18	Ca	S	Mo
Conus suturatus	1	0.01	1	Ca	S	Mo
Conus tessulatus	6	0.01	1	Ca	S	Mo
Volutidae						
Amoria damoni	1	0.01	1	Ca	S	Mo
Cymbiola cymbiola	5	0.07	2	Ca	S	Mo
unidentified	3	0.01	1	Ca	S	Mo
Turridae						
Gemmula hastula	37	0.10	17	Ca	S	Mo
Gemmula murrayi	9	0.03	4	Ca	S	Mo
Lophiotoma acuta	2	0.01	2	Ca	S	Mo
Lophiotoma indica	17	0.07	6	Ca	S	Mo
Turris crispa	4	0.04	3	Ca	S	Mo
Clavis sp.	4	0.02	3	Ca	S	Mo
Inquisitor sp. 1	34	0.16	3	Ca	S	Mo
Inquisitor sp. 2	5	0.02	3	Ca	S	Mo
Inquisitor sp. 3	1	0.01	1	Ca	S	Mo
Muricidae						
Chicoreus cervicornis	655	1.14	31	Ca	S	Mo
Cronia contracta	22	0.07	2	Ca	S	Mo
Haustellum multiplicatum	22	0.08	9	Ca	S	Mo
Murex acanthostephes	94	0.42	35	Ca	S	Mo
Murex pecten	4	0.07	2	Ca	S	Mo
Murex macgillivrayi	11	0.03	3	Ca	S	Mo
Thais echinata	1	0.01	1	Ca	S	Mo
Murex sp.	7	0.05	3	Ca	S	Mo
Mitridae						
Cancilla interlirata	2	0.01	2	Ca	S	Mo
Cancilla praestantissima	1	0.01	1	Ca	S	Mo
Neocancilla clathrus	1	0.01	1	Ca	S	Mo
Olividae						
Ancilla cingulata	7	0.04	2	Ca	S	Mo
Ancilla sp.	1	0.01	1	Ca	S	Mo
Nassariidae						
Nassarius algidus	2	0.01	2	Ca	S	Mo
Nassarius conoidalis	123	0.31	15	Ca	S	Mo
Nassarius crematus	2	0.01	1	Ca	S	Mo

	A	B	N	F	S	M
Terebridae						
Terebra lima	3	0.02	2	Ca	S	Mo
Terebra triseriata	28	0.07	10	Ca	S	Mo
Terebra turrita	7	0.04	6	Ca	S	Mo
Costellariidae						
Vexillum obeliscus	1	0.01	1	Ca	S	Mo
Vasidae						
Tudivasum spinosum	35	0.10	12	Ca	S	Mo
Buccinidae						
Phos senticosus	21	0.09	7	Ca	S	Mo
Harpidae						
Harpa articularis	3	0.06	3	Ca	S	Mo
Canncellariidae						
Cancellaria sp.	1	0.01	1	Ca	S	Mo
Cancellarius melanostoma	1	0.01	1	Ca	S	Mo
Fasciolariidae						
Latirus paetelianus	5	0.01	1	Ca	S	Mo
Coralliophilidae						
Laxatenia fimbriata	3	0.01	2	Ca	S	Mo
Melongenidae						
Syrinx aruanus	1	0.01	1	Ca	S	Mo
Cephalaspidea						
Philinidae						
Philine sp. 1	81	0.12	11	Ca	S	Mo
Philine sp. 2	1	0.01	1	Ca	S	Mo
Nudibranchia						
Doriopsilla sp.	2	0.02	2	He	S	Mo
sp. 1	1	0.01	1	He	S	Mo
sp. 2	6	0.03	4	He	S	Mo
sp. 3	1	0.01	1	He	S	Mo
sp. 4	1	0.01	1	He	S	Mo
sp. 5	4	0.03	3	He	S	Mo
sp. 6	1	0.01	1	He	S	Mo
sp. 7	1	0.01	1	He	S	Mo
sp. 8	1	0.01	1	He	S	Mo
sp. 9	1	0.01	1	He	S	Mo
sp. 10	6	0.03	1	He	S	Mo
sp. 11	1	0.01	1	He	S	Mo
sp. 12	3	0.12	1	He	S	Mo
Chromodorididae						
Ceratosoma cornigerum	4	0.04	3	He	S	Mo
Aegiridae						
Notodoris gardineri	12	0.12	1	He	S	Mo
Bivalvia						
Veneroida						
Veneridae						
Antigona chemnitzii	1	0.02	1	Su	S	Se
Antigonia lamellaris	31	0.70	13	Su	S	Se
Bassina calophylla	339	1.53	75	Su	S	Se
Circe scripta	77	0.75	7	Su	S	Se
Dosinia amina	1	0.01	1	Su	S	Se
Dosinia juvinilis	15	0.08	4	Su	S	Se

	A	B	N	F	S	M
Dosinia mira	216	1.74	40	Su	S	Se
Globovenus embrithes	5	0.07	1	Su	S	Se
Paphia exarata	39	0.21	11	Su	S	Se
Paphia semirugata	26	0.13	14	Su	S	Se
Paphia undulata	21	0.06	7	Su	S	Se
Placamen tiara	37	0.13	4	Su	S	Se
Pitar sp. nov	5	0.03	5	Su	S	Se
Semelidae						
Semele amabilis	21	0.26	14	Su	S	Se
Semele exarata	4	0.02	4	Su	S	Se
Leptomya sp.	1	0.01	1	Su	S	Se
Solenidae						
Solen fonesi	3	0.02	3	Su	S	Se
Tellinidae						
Macoma candida	2	0.03	2	De	S	Se
Tellina arafurensis	4	0.01	2	De	S	Se
Tellina donaciformis	2	0.01	2	De	S	Se
Tellina pretium	4	0.02	3	De	S	Se
Tellina pulcherrima	1	0.01	1	De	S	Se
Tellina sp. nov	5	0.01	1	De	S	Se
Tellina valtonis	1	0.01	1	De	S	Se
Cultellidae						
Cultellus cultellus	264	0.69	50	Su	S	Se
Cardiidae						
Cardium dampierensis	48	0.24	8	Su	S	Se
Ctenocardia virgo	88	0.19	8	Su	S	Se
Fragum retusum	6	0.01	1	Su	S	Se
Fulvia australe	16	0.05	8	Su	S	Se
Plagiocardium setosum	1	0.01	1	Su	S	Se
Vepricardium multispinosum	171	0.81	47	Su	S	Se
Gari anomala	1	0.01	1	Su	S	Se
Gari maculosa	1	0.01	1	Su	S	Se
Gari sp. nov. 1	1	0.01	1	Su	S	Se
Gari sp. nov. 2	5	0.02	4	Su	S	Se
Fulvia sp. nov. 1	4	0.04	3	Su	S	Se
Solecurtidae						
Azorinus minitus	8	0.03	6	Su	S	Se
Mactridae						
Mactrinula dolabrata	3	0.01	1	Su	S	Se
Arcoida						
Arcidae						
Anadara granosa	33	0.12	8	Su	S	Se
Anadara rotundicostata	27	0.12	4	Su	S	Se
Arca navicularis	35	0.16	2	Su	S	Se
Barbatia velata	5	0.03	5	Su	S	Se
Cucullaea labiata	30	0.24	12	Su	S	Se
Trisidos semitorta	22	0.28	8	Su	S	Se
sp. 1	1	0.01	1	Su	S	Se
Glycymerididae						
Melaxinia vitrea	59	0.49	21	Su	S	Se
Limopsidae						
Limopsis sp.	6	0.03	5	Su	S	Se

	A	B	N	F	S	M
Pterioida						
Pteriidae						
Pinctada sugillata	1668	26.12	1	Su	S	Se
Pteria levitata	9	0.03	3	Su	S	Se
Pteria zebra	1846	0.21	3	Su	S	Se
Pteria sp. nov.	2	0.01	2	Su	S	Se
Malleidae						
Malleus albus	36	1.81	14	Su	M	S
Malleus malleus	12	0.20	1	Su	S	Se
Pinnidae						
Pinna incurva	1	0.01	1	Su	S	Se
Pinna muricata	43	0.11	19	Su	S	Se
Mytiloida						
Mytilidae						
Lithophaga malaccana	2	0.01	1	Su	S	Se
Modiolus elongata	9	0.10	5	Su	S	Se
Modiolus metcalfei	1	0.01	1	Su	S	Se
Modiolus proclivis	15	0.04	8	Su	S	Se
Nuculoida						
Nuculidae						
Ennucula superba	56	0.25	13	De	S	Se
Nucula cumingii	5	0.02	4	De	S	Se
Nuculanidae						
Yoldia lata	17	0.05	10	De	S	Se
Myoida						
Corbulidae						
Corbula macgillivrayi	141	0.70	40	Su	S	Se
Corbula scaphoides	148	0.53	32	Su	S	Se
Laternulidae						
Laternula recta	15	0.05	8	Su	S	Se
Cuspidariidae						
Cuspidaria sp.	2	0.01	2	Su	S	Se
Clavagellidae						
Brechites sp.	1	0.01	1	Su	S	Se
Ostreoida						
Ostreidae						
Crassostrea echinata	7	0.07	2	Su	S	Se
Dendostraea folium	100	2.13	10	Su	S	Se
Lopha sp.	2	0.09	1	Su	S	Se
Pectinidae						
Annachlamys flabellata	33	0.19	8	Su	S	Se
Decatopecten strangei	6	0.03	3	Su	S	Se
Mimachlamys scabricostata	71	0.21	28	Su	S	Se
Minnivola isomeres	21	0.07	12	Su	S	Se
Minnivola sp. nov.	6	0.03	4	Su	S	Se
Propeamussiidae						
Amusium pleuronectes	556	3.83	57	Su	S	Se
Spondylidae						
Spondylus victoriae	28	1.31	2	Su	S	Se
Spondylus wrightianus	24	0.23	10	Su	S	Se

	A	B	N	F	S	M
Plicatulidae						
Plicatula australis	9	0.07	6	Su	S	Se
Plicatula essingtonensis	4	0.02	2	Su	S	Se
Hippuritoida						
Chamidae						
Chama fibula	5	0.03	2	Su	S	Se
Limoida						
Limidae						
Limaria fragilis	7	0.03	4	Su	S	Se
Scaphopoda						
Dentaliida						
Dentaliidae						
Dentalium annulosum	23	0.07	12	De	S	Se
Dentalium octangulatum	6	0.03	5	De	S	Se
Cephalopoda						
Sepioidea						
Sepia sp. 1	101	3.05	41	Ca	M	Mo
Sepia sp. 2	7	0.12	5	Ca	M	Mo
Sepia sp. 3	6	0.07	3	Ca	S	Mo
Sepia sp. 4	1	0.01	1	Ca	S	Mo
Teuthoidea						
sp. 1	203	0.42	4	Ca	S	Mo
sp. 2	11	0.05	3	Ca	S	Mo
Octopoda						
sp. 1	61	1.97	24	Ca	S	Mo
sp. 2	3	0.02	2	Ca	S	Mo
sp. 3	1	0.05	1	Ca	S	Mo
sp. 4	1	0.02	1	Ca	S	Mo
Bryozoa						
Retiflustia cornea	3134	4.96	41	Su	S	Se
Triphyllozoon sp.	1189	5.28	42	Su	S	Se
Adeonellopsis sp.	399	1.22	25	Su	S	Se
Scrupocellaria sp.	703	2.17	34	Su	S	Se
Amathia sp.	2091	4.56	38	Su	S	Se
sp. 1	249	1.84	19	Su	S	Se
sp. 2	411	1.11	27	Su	S	Se
sp. 3	143	0.25	6	Su	S	Se
sp. 4	97	0.51	8	Su	S	Se
sp. 5	533	2.63	15	Su	S	Se
sp. 6	394	0.55	9	Su	S	Se
sp. 7	141	0.85	10	Su	S	Se
sp. 8	333	0.37	8	Su	S	Se
sp. 9	45	0.04	2	Su	S	Se
sp. 10	29	0.30	8	Su	S	Se
sp. 11	11	0.23	1	Su	S	Se
sp. 12	22	0.04	5	Su	S	Se
sp. 13	29	0.60	1	Su	S	Se
sp. 14	71	0.15	5	Su	S	Se
sp. 15	12	0.07	2	Su	S	Se
sp. 16	6	0.02	3	Su	S	Se
sp. 17	176	0.85	11	Su	S	Se
sp. 18	2	0.01	1	Su	S	Se

	A	B	N	F	S	M
sp. 19	26	0.08	1	Su	S	Se
sp. 20	5	0.01	1	Su	S	Se
sp. 21	5	0.10	4	Su	S	Se
sp. 22	17	0.03	1	Su	S	Se
sp. 23	1	0.05	1	Su	S	Se
Echinodermata						
Crinoidea						
sp. 1	939	4.24	41	Su	S	Mo
sp. 2	2	0.01	1	Su	S	Mo
sp. 3	46	0.26	10	Su	S	Mo
sp. 4	30	0.18	15	Su	S	Mo
sp. 5	11	0.15	7	Su	S	Mo
sp. 6	1	0.01	1	Su	S	Mo
sp. 7	68	0.60	3	Su	S	Mo
sp. 8	1	0.01	1	Su	S	Mo
sp. 9	3	0.02	3	Su	S	Mo
sp. 10	10	0.69	6	Su	S	Mo
sp. 11	135	0.94	15	Su	S	Mo
sp. 12	3	0.02	2	Su	S	Mo
sp. 13	2	0.04	2	Su	S	Mo
sp. 14	5	0.35	1	Su	S	Mo
sp. 15	2	0.15	2	Su	S	Mo
sp. 16	8	0.23	6	Su	S	Mo
sp. 17	2	0.02	2	Su	S	Mo
sp. 18	1	0.09	1	Su	S	Mo
sp. 19	19	0.26	2	Su	S	Mo
sp. 20	6	0.03	2	Su	S	Mo
sp. 21	2	0.04	2	Su	S	Mo
Asteroidea						
sp. 1	100	0.28	31	Ca	S	Mo
sp. 4	29	2.10	1	Ca	S	Mo
sp. 5	1	0.01	1	Ca	S	Mo
sp. 6	2	0.04	1	Ca	S	Mo
sp. 8	2	0.01	2	Ca	S	Mo
sp. 10	2	0.07	1	Ca	S	Mo
sp. 11	2	0.01	1	Ca	S	Mo
sp. 12	8	0.03	3	Ca	S	Mo
sp. 13	38	12.11	2	Ca	S	Mo
sp. 14	1	0.04	1	Ca	S	Mo
sp. 15	5	3.44	2	Ca	L	Mo
sp. 16	5	1.45	2	Ca	S	Mo
sp. 17	5	0.02	3	Ca	S	Mo
sp. 18	2	0.46	1	Ca	S	Mo
sp. 19	4	0.18	1	Ca	M	Mo
Valvatida						
Goniasteridae						
Iconaster longimanus	34	0.28	2	Ca	S	Mo
Stellaster equestris	221	0.76	11	Ca	S	Mo
Platyasterida						
Luidiidae						
Luidia hardwicki	2	0.04	1	Ca	S	Mo
Luidia maculata	18	0.25	5	Ca	M	Mo

	A	B	N	F	S	M
Paxillosida						
Asteropectinidae						
Astropecten granulatus	107	1.14	25	Ca	S	Mo
Astropecten polyacanthus	33	0.11	6	Ca	S	Mo
Astropecten sp. 1	115	0.24	27	Ca	S	Mo
Astropecten sp. 4	70	0.17	9	Ca	S	Mo
Spinulosida						
Metrodiridae						
Metrodira subulata	69	0.96	14	Ca	S	Mo
Pterasteridae						
Euretaster insignis	13	0.25	5	Ca	S	Mo
Echinoidea						
Spatangoida						
Brissopsis sp.	4	0.02	2	De	S	Mo
Rhinobrissus sp.	24	1.23	10	De	M	Mo
sp. 2	88	0.70	8	De	S	Mo
sp. 4	74188	674.44	4	De	S	Mo
sp. 5	54	0.90	2	De	S	Mo
sp. 6	6	0.10	2	De	S	Mo
sp. 7	102	1.61	8	De	S	Mo
sp. 8	5	0.21	3	De	S	Mo
sp. 10	4	0.04	2	De	S	Mo
sp. 11	3	0.08	2	De	S	Mo
Spatangidae						
Maretia ovata	7247	18.54	12	De	S	Mo
Maretia planulata	64596	333.74	5	De	S	Mo
Echinoida						
Prionocidaris sp. 1	4	0.15	3	He	S	Mo
Prionocidaris sp. 2	5	0.05	1	He	S	Mo
sp. 1	10	0.02	2	He	S	Mo
sp. 2	200	0.62	17	He	S	Mo
sp. 3	239	2.67	23	He	S	Mo
sp. 4	28	0.04	2	He	S	Mo
sp. 5	8	0.03	4	He	S	Mo
sp. 6	11	0.29	2	He	S	Mo
Diadematoida						
Diadematidae						
Chaetodiadema granulatum	44	3.65	13	He	M	Mo
Clypeasteroida						
Laganidae						
Laganum sp. 1	20949	32.07	43	De	S	Mo
Laganum sp. 2	418	0.63	20	De	S	Mo
Laganum sp. 3	42	0.68	10	De	S	Mo
Holothurioidea						
sp. 1	19	0.12	5	De	S	Mo
sp. 2	17	0.15	7	De	S	Mo
sp. 3	33	0.28	5	De	S	Mo
sp. 5	8	0.06	4	De	S	Mo
sp. 6	4	0.04	3	De	S	Mo
sp. 7	24	0.34	6	De	S	Mo
sp. 8	5	0.07	2	De	S	Mo
sp. 9	1	0.01	1	De	S	Mo

	A	B	N	F	S	M
sp. 10	1	0.01	1	De	S	Mo
sp. 11	3	0.01	1	De	S	Mo
sp. 12	17	0.26	5	De	S	Mo
sp. 13	4	0.02	2	De	S	Mo
sp. 15	5	0.02	3	De	S	Mo
sp. 16	1	0.01	1	De	S	Mo
sp. 17	15	0.11	5	De	S	Mo
sp. 18	2	0.04	1	De	S	Mo
sp. 19	3	0.02	2	De	S	Mo
sp. 20	2	0.01	2	De	S	Mo
sp. 21	3	0.02	1	De	S	Mo
sp. 23	1	0.04	1	De	S	Mo
sp. 24	2	0.02	2	De	S	Mo
sp. 25	10	0.08	5	De	S	Mo
sp. 26	3	0.01	1	De	S	Mo
sp. 27	1	0.01	1	De	S	Mo
sp. 28	1	0.01	1	De	S	Mo
sp. 29	7	0.02	2	De	S	Mo
sp. 31	2	0.01	1	De	S	Mo
sp. 32	2	0.01	1	De	S	Mo
sp. 33	7	0.02	1	De	S	Mo
sp. 34	1	0.01	1	De	S	Mo
sp. 35	1	0.01	1	De	S	Mo
Dendrochirotida						
Cucumariidae						
Leptopentacta grisea	22	0.22	7	De	S	Mo
Pentacta anceps	59	1.19	8	De	S	Mo
Pseudocolochirus axiologus	7	2.84	3	De	L	Mo
Aspidochirotida						
Holothuriidae						
Bohadschia marmorata	5	0.04	1	De	L	Mo
Holothuria ocellata	31	1.59	13	De	L	Mo
Holothuria pervicax	91	3.99	23	De	M	Mo
Holothuria scabra	6	7.49	1	De	M	Mo
Stichopodidae						
Stichopus horrens	11	2.26	2	De	M	Mo
Molpadida						
Caudinidae						
Acaudina sp. 1	31	0.75	11	De	S	Mo
Acaudina sp. 2	8	0.32	6	De	M	Mo
Acaudina sp. 3	50	2.87	13	De	M	Mo
Acaudina sp. 4	19	0.78	8	De	S	Mo
unidentified	3	0.15	1	De	X	Mo
Ophiuroidea						
Amphioplus sp.	64	0.04	8	De	S	Mo
sp. 1	339	0.57	14	De	S	Mo
sp. 2	98	0.37	19	De	S	Mo
sp. 3	207	0.35	42	De	S	Mo
sp. 4	1	0.01	1	De	S	Mo
sp. 5	260	0.47	3	De	S	Mo
sp. 6	75	0.26	19	De	S	Mo
sp. 7	5	0.02	3	De	S	Mo

	A	B	N	F	S	M
sp. 8	1040	0.48	61	De	S	Mo
sp. 9	42	0.10	18	De	S	Mo
sp. 10	12	0.06	10	De	S	Mo
sp. 11	19	0.05	9	De	S	Mo
sp. 12	9	0.04	8	De	S	Mo
sp. 13	1	0.01	1	De	S	Mo
sp. 14	2	0.01	1	De	S	Mo
sp. 15	13	0.06	2	De	S	Mo
sp. 16	4	0.01	1	De	S	Mo
sp. 18	1	0.01	1	De	S	Mo
sp. 19	57	0.14	8	De	S	Mo
sp. 20	1	0.01	1	De	S	Mo
sp. 21	1	0.01	1	De	S	Mo
sp. 22	1	0.01	1	De	S	Mo
sp. 23	1	0.01	1	De	S	Mo
sp. 24	1	0.01	1	De	S	Mo
sp. 27	1	0.01	1	De	S	Mo
sp. 28	1	0.01	1	De	S	Mo
sp. 29	3	0.02	3	De	S	Mo
sp. 30	1	0.01	1	De	S	Mo
Phrynophiurida						
Gorgonocephalidae						
sp. 1	19	0.75	11	De	S	Mo
sp. 2	2	0.05	2	De	S	Mo
Chordata						
Ascidiacea						
sp. 1	281	0.77	30	Su	S	Se
sp. 2	46	0.16	2	Su	S	Se
sp. 3	36	0.09	9	Su	S	Se
sp. 4	25	0.14	9	Su	S	Se
sp. 5	21	0.09	1	Su	S	Se
sp. 6	2	0.01	1	Su	S	Se
sp. 7	1	0.01	1	Su	S	Se
sp. 8	2	0.01	2	Su	S	Se
sp. 9	7	0.13	4	Su	S	Se
sp. 10	21	0.21	1	Su	S	Se
sp. 11	2	0.05	1	Su	S	Se
sp. 12	5	0.86	1	Su	S	Se
sp. 13	4	0.02	2	Su	S	Se
sp. 14	21	0.09	1	Su	S	Se
sp. 15	7	0.05	1	Su	S	Se
Enterogona						
Polyclinidae						
Polyclinum sp.	11	0.31	4	Su	M	Se
Ascidiidae						
Ascidia sydneiensis	10	0.47	3	Su	S	Se
Phallusia millari	497	12.22	19	Su	S	Se
Holozoidae						
Hypodistoma deerratum	58	4.55	9	Su	S	Se

	A	B	N	F	S	M
Didemnidae						
sp. 1	36	0.21	7	Su	S	Se
sp. 2	49	0.46	9	Su	S	Se
sp. 3	3	2.11	1	Su	S	Se
sp. 4	1	0.01	1	Su	S	Se
sp. 5	2	0.08	1	Su	S	Se
sp. 6	27	0.31	2	Su	S	Se
sp. 7	1	0.01	1	Su	S	Se
sp. 8	2	0.02	1	Su	S	Se
sp. 9	1	0.22	1	Su	S	Se
Pleurogona						
Styelidae						
Polycarpa chinensis	399	0.48	12	Su	S	Se
Polycarpa sp.	1	0.13	1	Su	S	Se
Pyuridae						
Halocinthia hispida	1	0.01	1	Su	S	Se
Hartmeyeria formosa	396	0.21	2	Su	S	Se
Pyura obesa	2	0.03	1	Su	S	Se
Pyura sacciformis	124	6.08	18	Su	S	Se
Pyura sp.	10	0.10	2	Su	S	Se

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